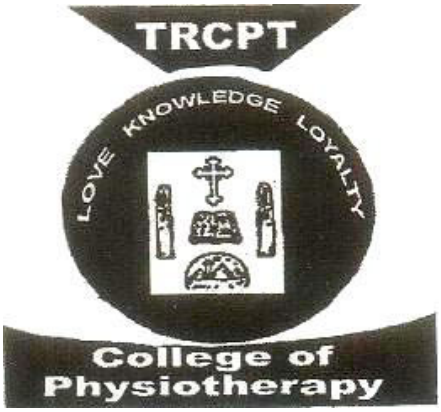
A COMPARATIVE STUDY ON THE EFFICACY OF MYOFASCIAL TRIGGER POINT RELEASE WITH STRETCHING AND DRY NEEDLING IN PLANTAR HEEL PAIN



Dissertation Submitted To

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI

TOWARDS PARTIAL FULFILLMENT AS REQUIREMENT FOR THE DEGREE

MASTER OF PHYSIOTHERAPY

APRIL 2015

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Internal Examiner:

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CERTIFICATE

This is to certify that the research work entitled **"A COMPARATIVE STUDY ON THE EFFICACY OF MYOFASCIAL TRIGGER POINT RELEASE WITH STRETCHING AND DRY NEEDLING IN PLANTAR HEEL PAIN"** was carried out by the candidate with the **(REG NO: 271410141)** Master of physiotherapy student at Thanthai Roever Collage of Physiotherapy, Perambalur, submitted to Tamil Nadu Dr. M.G.R. Medical University, Chennai towards the partial fulfillment as a requirement for the Degree Master of Physiotherapy **(MPT- ORTHPAEDICS).**

Prof. C.V. John Franklin, MPT. MIAP.
Principal
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Perambalur -621212

CERTIFICATE

This is to certify that the research work entitled **"A COMPARATIVE STUDY ON THE EFFICACY OF MYOFASCIAL TRIGGER POINT RELEASE WITH STRETCHING AND DRY NEEDLING IN PLANTAR HEEL PAIN"**was carried out by the candidate with the **(REG NO: 271410141)** Thanthai Roever College of Physiotherapy Perambalur under the guidance of me towards the partial fulfillment as a requirement for the degree Master of Physiotherapy Submitted to The Tamil Nadu Dr. MGR Medical University Chennai. **(MPT- ORHOPAEDICS).**

GUIDE

Prof. C.V. John Franklin, MPT., MIAP.,

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INTRODUCTION

Plantar heel pain is one of the most common musculoskeletal pathologies of the foot. It is estimated to effect 10% of the population at some time in their life. It affects more elderly people than young adults. It not only affects athletic people but also non- athletic people. Plantar heel pain has been shown to have a serious impact on health-related quality of life.

It is usually felt as an intense pain when the affected heel is used. The pain is usually worse when you get out of bed in the morning or after a long period of activity. In most cases, only one heel is affected. After walking, the pain usually improves. However, it is common for it to be painful when you first take a step after a period of rest. Standing and walking becomes very painful. The pain often worsens by the end of the day. Heel pain is common and can be due to a number of conditions. The calcaneus (heel bone) is the largest bone in the foot and is the first to hit the ground when walking. It is often characterized by progressive pain with weight bearing, especially the first step in the morning and stiffness. Many factors have been purported to cause plantar heel pain, including over – use biomechanical derangements, inflammatory arthritis, stress factors, nerve entrapment, and defective running shoe construction. Aims et al found that 78 % of patient s with painful heels had ankle dorsiflexion limitations of at least 5 degree.

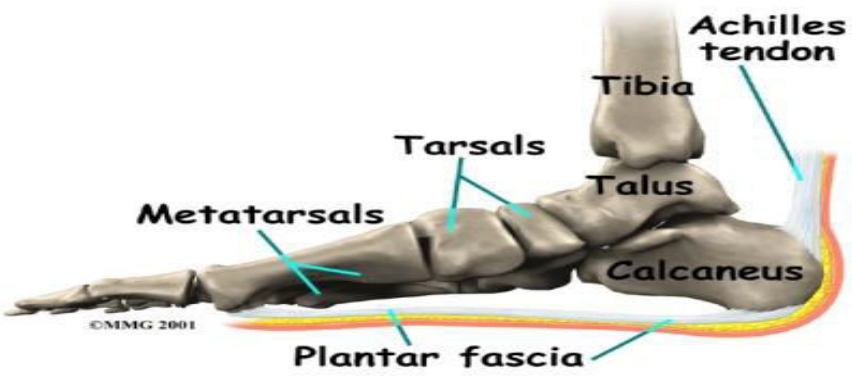
The Weight gain, occupational related activity, anatomical variations, poor biomechanics, overexertion and inadequate footwear are limited condition, it can take months to years to resolve, presenting a challenge for clinicians. In the United States more than 2 million individuals are treated for plantar heel pain on an annual basis; accounting for 11 – 15 percent of professionals visit related to foot pain.

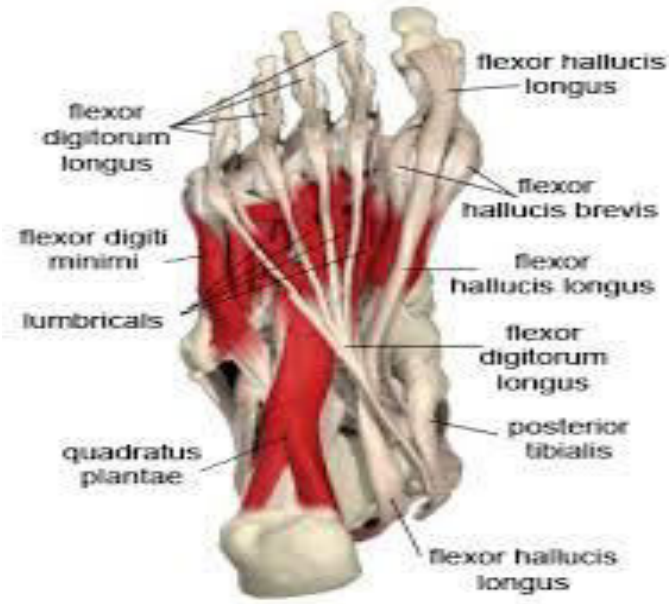
PLANTAR HEEL PAIN

THE ANATOMY OF HEEL PAIN:

The heel bone is designed to be the first contact the foot has with the ground.

The Achilles tendon inserts into the back of the heel bone called the calcaneus and a very strong ligament along the bottom of the foot attaches to the bottom of the heel bone called the plantar fascia. Several small muscles also attach to the heel bone above the insertion of the plantar fascia. Given the forces of walking that the heel bone is subjected to and the pull of all these ligaments and muscles, then it is not surprising that heel pain is so common.





The causes of heel pain:

There is no one cause of heel pain. Lot of text books have been written on Disorders of the Heel. Some of the types of problems that can be seen in the heel include:

1. Heel spurs - these are small bony spurs that often develop on the bottom of the heel. They do not really cause any problems. It is only mentioned here as it is a common myth that they are a problem - almost always the pain associated with heel spurs is really plantar fasciitis.
2. Plantar fasciitis is the most common cause of heel pain and is due to a strain of the long ligament along the bottom of the foot. The most symptom is pain when getting out of bed first thing in the morning ('post-static dyskinesia')

3. A number of disease processes can uncommonly cause heel pain, such as rheumatoid arthritis, Ankylosing spondylitis and gout.
4. Stress fractures, which is an abnormal reaction of bone to stress can occur in those that are very active (eg athletes) or have weaker bones (eg osteoporosis).
5. Fat pad atrophy also gives pain in the plantar aspect of the heel.
6. A 'stone' bruise is sometimes considered to be a cause of heel pain - it is simply a bruise of the bone.
7. Another cause of heel pain is problems in the calf muscles and foot muscles that refer pain to the heel (Myofascial trigger points) or pain referred from the lower back via the nerves from the back to the heel.
8. Heel pain in children is usually due to severs disease or calcaneal apophysitis.
9. Poor biomechanics like standing long hours, sitting on a high chairs, using improper footwear etc.

The Initial Conservative Treatment Options

Physical medicine modalities are well known for their benefits and they have been consistently applied in early treatment of plantar fasciitis. Typically, the direct application of ice, ice baths or contrast soaking aid in the local reduction of inflammation and temporarily augment pain management.

Electric stimulation may only provide indirect reduction of interstitial inflammation of the plantar fascia. Ultrasound therapy, hot pack systems and deep tissue massage help eliminate inflammation and aid in restoring plantar

fascia tensegrity. Generally, these modalities are considered to be valuable adjuncts to a well-organised treatment plan.

Various programs of stretching, range of motion and therapeutic exercises can help re-establish foot function and improve tolerance to load. When it is done appropriately, stretching can serve as an important adjunct to the resumption of the plantar fascia's ability to tolerate eccentric loading forces that typically occur during stance and gait.

Night splinting has proven to be an effective tool in managing persistent plantar fasciitis.

Anti-inflammatory modalities, such as ice and ice baths, are often the first line of treatment. Oral NSAIDs have been a mainstay of treatment. While they effectively relieve symptoms, be aware that they frequently fail to promote sustained relief. When inflammation is severe or fails to respond to initial efforts, one may consider corticosteroid injection(s). However, keep in mind that corticosteroid injections impose the risk of aponeurosis rupture secondary to focal collagen tissue necrosis and can result in focal heel fat pad atrophy.

Shoes, orthotics, splinting and/or immobilization form the cornerstone for successful functional management of plantar fasciitis. When you take the overuse nature of plantar fasciitis into account and attempt to re-establish the windlass mechanism of the foot, there is an enhanced potential for success.

The shoe also serves as a vital and functional link between an orthotic and the foot. Orthotics have long been considered to be a reliable method for treating plantar fasciitis. Heel cushions, heel cups and cushioning pads appear to provide immediate pain relief for many people who have plantar fasciitis. This relief is frequently short-lived and requires other treatment modalities for success.

Neutral position taping and strapping of the foot provides temporary symptomatic relief of pain caused by plantar fasciitis. Although the functional benefits are temporary and likely do not last longer than 10 minutes with exercise, the soft tissue compression and symptomatic relief afforded by the strapping can last for nearly a week.

EXPLORING MYOFASCIAL PAIN AND TRIGGER POINTS

Myofascial Pain:

MYO is muscle: FASCIA is the connective tissue that holds us together. Myofascial pain comes from trigger points in muscles and the fascia that is interwoven throughout and covering them.

Trigger points: The term "trigger point" was coined in 1942 by Dr. Janet Travell, an American cardiologist. According to Travell, Trigger points are hypersensitive, tightened spots which can occur in any muscle. These spots or nodules are found within a taut band in the muscle. Trigger points cause pain, tingling, burning, weakness and other symptoms. They have a special property called referred pain. Trigger points can be active and latent.

They are established by the trauma that occurs during injury from accidents, sports, occupations and disease. They can also be caused by long term or repetitive strain on muscles from poor ergonomics, posture and repetitive movements. Physical or emotional stress frequently aggravates trigger points. Myofascial pain accounts for as much as 85% of the pain people suffer from. Acute and chronic Myofascial pain due to trigger points is a very common condition

AETIOLOGY:

1. Physical stress- muscle overloading, repetitive strain
2. Psychological stress-anxiety, depression
3. Visceral disorders- diseases and disorders of internal organs.

Pathophysiology of TrPs:

The epicenter of TrP formation is at the motor endplate. Trauma to the sarcoplasmic reticulum causes an uncontrollable release of calcium ions, which in turn causes sarcomere contraction. Multiple contracted sarcomeres cause the taut band. A so called “energy crisis” forms due to an increase in energy demand of the contractions and a decreased energy supply (lack of ATP) due to constricted vessels.

Due to the lack of ATP, a decreased uptake of Ca2+ further perpetuates sustained contractions. As a result there is localized hypoxia and a release of sensitizing substances and cause pain.

Under normal conditions, pain from TrPs is mediated by thin myelinated (Ad) fibres and unmyelinated (C) fibres. Various noxious and innocuous events, such as mechanical stimuli or chemical mediators, may excite and sensitize Ad fibres and C fibres and thereby play a role in the development of TrPs.

Other theories suggest that there are at least three pathophysiological processes that may be involved in the development and maintenance of TrPs tenderness.

These include:

- Sensitization of peripheral muscle nociceptors,
- Sensitization of second-order neurons in the dorsal horn and in the trigeminal nucleus
- Dysregulation of the descending endogenous pain control system.

Benefits of Myofascial Trigger Point Therapy:

- Eliminate or decrease pain.
- Increase range of motion, flexibility and strength.
- Improve sleep, a common problem associated with Myofascial pain.
- Increase endurance at work and play.
- Decrease or eliminate medication.
- General improvement in quality of life and fitness level, increased energy and reduced stress.
- Increase body awareness.

Clinical Assessment of TrPs:

Finding a TrP in a taut band by palpation is skill that requires practice and is based on the clinician's sense of feel. This is further assisted by visual cues of a local twitch response (LTR) and verbal cues from the patient regarding localized and referred pain or reproduction of the patient's symptoms. TrPs are felt as hard nodules like small pea or taught band by flat palpation or pincer palpation according to the muscle.

DESCRIPTION OF MANUAL TRIGGER POINT RELEASE:

To treat Trigger Points manually, heavy sustained tolerable pressure must be applied to the Trigger Point. Light pressure is not effective for treating Trigger Points, and in fact may increase spasms as the muscle tries to protect itself, leading to increased and more constant pain. In contrast, moderate to heavy pressure applied to a Trigger Point causes the pain to initially increase, but then as the muscle relaxes the pain will fade. Pressure should be applied slowly and released slowly for best results. The pressure should be maintained until there is a change in pain. After applying pressure to Trigger Points, the relaxed muscle should be stretched. If the muscles are not returned to normal length, there is a greater likelihood the Trigger Points will reoccur. Stretching is safer and less painful after the Trigger points have been treated.

DESCRIPTION OF DRY NEEDLING:

Dry needling is a skilled intervention that uses a thin filiform needle to penetrate the skin and stimulate underlying Myofascial trigger points, muscular, and connective tissues for the management of neuro-musculoskeletal pain and movement impairments. It is a technique used to treat dysfunctions in skeletal muscle, fascia, and connective tissue, and to diminish persistent peripheral nociceptive input, and reduce or restore impairments in body structure and function, leading to improved activity and participation.

MUSCLES INVOLVED IN PLANTAR HEEL PAIN:

According to Doctors Janet Travell and David Simons in their widely acclaimed medical textbook, Myofascial Pain and Dysfunction: The Trigger Point Manual, Myofascial trigger points (tiny contraction knots) in overworked or poorly conditioned muscles are the most frequent cause of pain in the ankles, feet, and toes.

Misdiagnosis of Plantar Fasciitis:

Travell and Simons believe that a diagnosis of plantar fasciitis or heel spurs is often mistakenly applied when physicians are uninformed about Myofascial pain. Trigger points typically refer pain; that is, they send pain to some other site. Physicians and other healthcare workers are commonly led astray by this phenomenon.

Pressure applied to the arch of the foot is often the test used for determining whether you have plantar fasciitis. If it hurts to press there, the tendons and fascia in the bottom of your foot are presumably inflamed.

Few practitioners are aware that this spot is where you will find trigger points in the flexor digitorum brevis and quadratus plantae muscles of the foot. These trigger points are typically quite tender to pressure. Their pain referral is to the bottom of the foot, particularly to the heel.

When not mislabelled plantar fasciitis, heel pain is often falsely blamed on heel spurs. Heel spurs can be present and actually not be the cause of the pain. Indisputable evidence of the harmlessness of a heel spur is when trigger point therapy stops the pain. Trigger points in the soleus muscles of the calves are the primary cause of heel pain and treatment to this muscle works amazingly faster and quick.

Referred Pain

Doctors Travell and Simons point out that the eleven muscles of the lower leg are actually foot muscles. Anatomists call them “extrinsic” foot muscles, meaning they operate from outside the foot. The muscles in the foot itself are “intrinsic” foot muscles, meaning they work from inside the foot.

The implication of these facts is that foot pain may not be coming from the feet themselves, but may be referred pain from trigger points in muscles of the lower leg. You can waste a lot time rubbing and soaking your feet, if your foot pain is coming from somewhere else.

The Soleus Muscle

Location: The soleus is a large flat muscle that lies beneath the gastrocnemius muscle on the back of the lower leg.

Origins: fibula, medial border of tibia (soleal line)

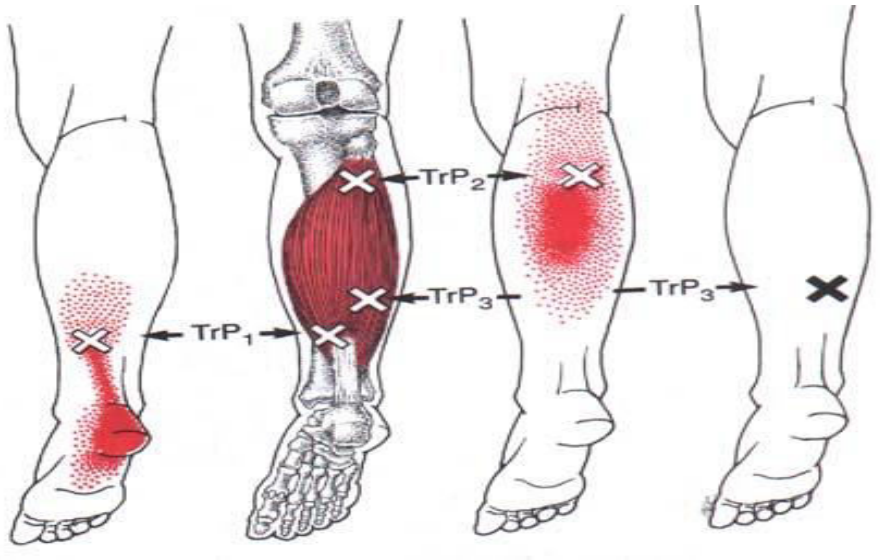
Insertion: into tendo calcaneus.

Function: The soleus undergoes a lengthening (eccentric) contraction to control ankle stability during the heel strike phase of walking. It also may contract during the push-off phase if the person is walking fast, jogging, jumping, or running. It also acts as a "second heart" to help push venous blood back up the leg to the trunk.

Muscle Structure: Unlike the gastrocnemius, the soleus muscle does not cross the knee joint. It attaches superiorly to the head of the fibula and along the posterior and medial aspects of the tibia bone. Its fibres extend down the back of the lower leg and join to the Achilles tendon (along with the gastrocnemius muscle fibres) and attach to the calcaneus or heel bone. The muscle is sandwiched between two sheets of hard fascia to form what is called the "soleus bridge". This structure surrounds and protects the many blood vessels and nerves that travel down the central canal of the lower leg.

Muscle Actions: Contraction of the soleus produce plantar flexion (downward push) of the foot at the ankle. Unlike the gastrocnemius, the soleus can produce plantar flexion of the foot even if the knee is also flexed. It may also assist with inversion of the foot in some situations.

Nerve supply: Tibial nerve, specifically, nerve roots L5–S2



Synergistic Muscles: The following muscle groups share common biomechanical functionality with the soleus and may become overloaded if it's unable to perform its workload due to trigger point activity or injury.

The gastrocnemius and soleus muscles together form the triceps surae muscle group that is the primary plantar flexors of the foot.

The tibialis posterior and peroneus longus muscles also assist with plantar flexion of the foot.

Antagonistic Muscles: The tibialis anterior and peroneus tertius are the primary dorsi flexors of the foot and may become overloaded if there is trigger point activity in the soleus and other plantar flexors of the foot.

THE GASTROCNEMIUS MUSCLE:

The gastrocnemius is the largest of the calf muscles, and "largely" contributes to the shape of the calf region on the back of the lower leg. It is the most superficial of the calf muscles, with the soleus and tibialis posterior muscles lying deep to it.

Contrary to popular belief, the gastrocnemius contributes very little to the push-off force used to propel the body forward during walking and running. It is more often used in an eccentric manner (a contraction that slows the mechanical stretching of a muscle) to control the forward momentum of the body during ambulation, and to stabilize both the knee and ankle joints during ambulation.

This muscle may also assist the soleus muscle in providing the extra push-off force necessary to jump, walk uphill, walk up or down stairs, and to bicycle.

Muscle Attachments:

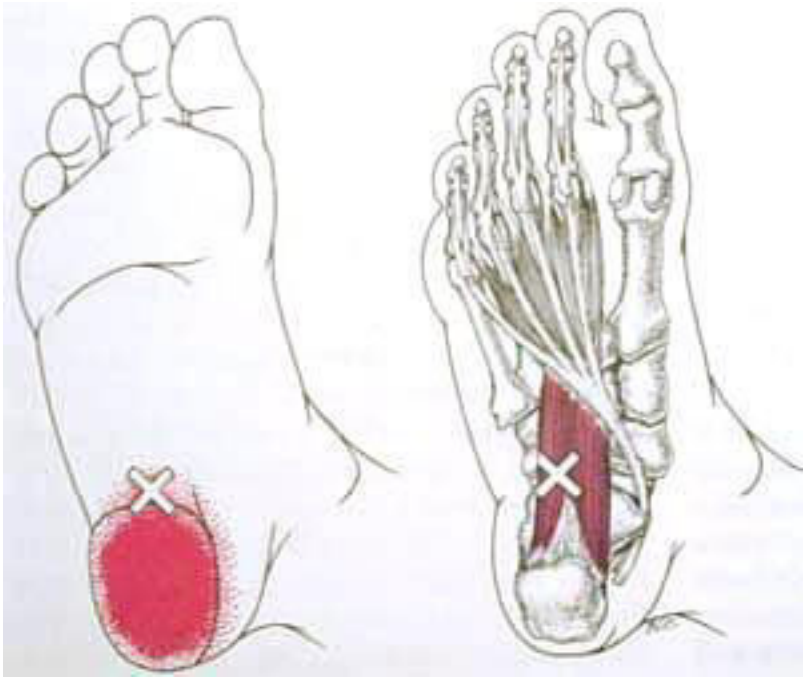
Origins: Both heads of the gastrocnemius attach superiorly to the medial and lateral condyles of femur and extend downward, across the back of the knee joint.

Insertion: attach to the calcaneus via the Achilles tendon.

Muscle Actions: Contraction of the gastrocnemius primarily produces plantar flexion of the foot, though it may also supinate the foot and assist with flexion of the knee.

Nerve supply: Tibial nerve from the sciatic, specifically, nerve roots S1–S2

QUADRATUS PLANTAE MUSCLE:



Origin: Lateral head: attaches to the lateral side of the calcaneus and to the long plantar ligament

Medial Head: attaches to the medial surface of the calcaneus

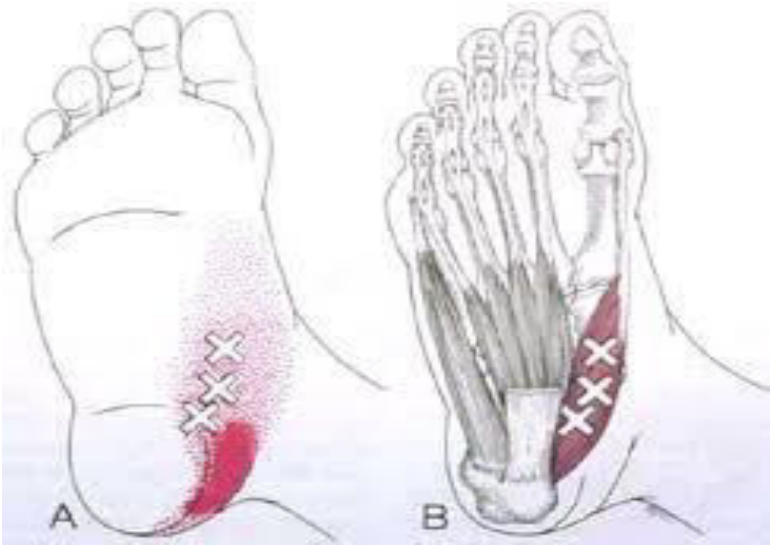
Insertion: Attaches into the dorsal and plantar surface of the tendons of the flexor digitorum longus.

Action: Assists Flexor digitorum longus in flexion of DIP joints

Innervation: Lateral plantar nerve (S1, 2)

Synergist: Flexor digitorum longus, Flexor digitorum brevis, Lumbricals, Interossei

ABDUCTOR HALLUCIS MUSCLE:



Origin: Flexor retinaculum, the medial process of the calcaneal tuberosity, the plantar aponeurosis, and the intramuscular septum between it and flexor digitorum brevis

Insertion: Medial side of the base of the proximal phalanx of the great toe, with some of its fibres attaching more proximally to the medial sesamoid bone

Action: Abduction of the great toe, flexion of the great toe

Innervation: Medial plantar nerve (S1, 2)

NEED OF THE STUDY

Heel is the first contact surface of the human body on the ground for locomotion. Upon ground contact the body encounters impact forces which are detected by the plantar foot to provide human movement. The prevalence rate of heel pain is increasing among the general population day by day. It is becoming a major problem and causing inefficiency in long standing workers and thereby loss of pay to workers like sales person, teachers, lecturers, policemen and home makers etc. Women and elderly people are more prone to planter heel pain.

Various physiotherapy treatment protocols have been advocated till now such as taping, ultrasound therapy, laser therapy, phonophoresis, ionotophoresis, stretching and orthotics. Recent advancement of Myofascial trigger pain and dysfunction science explores a new vision into Dry needling therapy and Myofascial trigger point release as an effective protocol nowadays. Both the treatment protocols are gaining good reputation in this modern days.

The purpose of this study is to check which treatment technique is more effective in reducing pain and improving function. There are many individual studies which have been done to check the effectiveness of Myofascial trigger release and stretching and there are many individual studies in dry needling to check the effectiveness on pain and function in the patients with plantar heel pain.

The comparative effect of above techniques will be checked in this study since there is no other comparative studies have been done on these two techniques.

HYPOTHESIS

ALTERNATE HYPOTHESIS:

- There will be a significant reduction in pain and disability when treated with Manual Myofascial Trigger Release technique in patients with plantar heel pain.
- There will be a significant reduction in pain and disability when treated with Myofascial Dry needling technique in patients with plantar heel pain.
- There will be significant difference between Manual Myofascial Trigger Release and Myofascial Dry Needling in reducing pain and improving the ability among plantar heel pain patients.

NULL HYPOTHESIS:

- There will be no significant reduction in pain and disability when treated with Manual Myofascial Trigger Release technique in patients with plantar heel pain.
- There will be no significant reduction in pain and disability when treated with Myofascial Dry Needling technique in patients with plantar heel pain.
- There will be no significant difference between Manual Myofascial Trigger Release in reducing pain and improving the ability among plantar heel pain patients.

AIM AND OBJECTIVES

AIM:

To compare the efficacy of the treatment manual Myofascial trigger Point Release with stretching and Dry Needling on plantar heel pain.

OBJECTIVES:

- To determine the efficacy of Manual Myofascial Trigger Point Release with stretching in plantar heel pain on VAS.
- To determine the efficacy of Manual Myofascial Trigger Point Release with stretching in plantar heel pain on FFI.
- To determine the efficacy of Dry Needling in plantar heel pain on VAS.
- To determine the efficacy of Dry Needling in plantar heel pain on FFI.
- To compare the efficacies of Manual Myofascial Trigger Point Release with stretching and Dry Needling in plantar heel pain on VAS.
- To compare the efficacies of Manual Myofascial Trigger Point Release with stretching and Dry Needling in plantar heel pain on FFI.

REVIEW OF LITERATURE

- **Gerwin RD 2004,** this study proposes an expansion of this hypothesis to account for new experimental data and established muscle pathophysiology. This study explains how Eccentric exercise, eccentric exercise in unconditioned muscle, or maximal or submaximal concentric exercise, ischemia and hypoxia leads to muscle fibre damage. Changes in Acidic pH, inhibition of acetyl cholinesterase, increased release of CGRP, and activation of ASIC are causes of muscle nociception and leads to widespread changes in the pain matrix. How Pro-inflammatory mediators such as SP (substance P), CGRP (Calcitonin gene-related peptide receptors), K+, 5-HT, cytokines, and BK profoundly alters the activity of the motor endplate and activity/sensitivity of muscle nociceptors and wide dynamic-range neurons is explained. Motor end plate noise, neuroplastic changes like phenomena of hypersensitivity, allodynia, and referred pain that is characteristic of the active Myofascial TrP are also explained.

- ***David G. Simons* 2006**, this study provides the best evidence informed review of the current scientific understanding of Myofascial trigger points with regard to their aetiology, path physiology, and clinical implications. The clinical aspects of Myofascial trigger points, the inter-rater reliability for identifying Myofascial trigger points, and several characteristic features are discussed, including the taut band, local twitch response, and referred pain patterns. The aetiology of Myofascial trigger point is discussed with a detailed and comprehensive review of the most

common mechanisms, including low-level muscle contractions, uneven intra-muscular pressure distribution, direct trauma, unaccustomed eccentric contractions, eccentric contractions unconditioned muscle, and maximal or sub-maximal concentric contractions. The article explains with a summary of frequently encountered precipitating and perpetuating mechanical, nutritional, metabolic, and psychological factors relevant for physical therapy practice.

- **Jan Dommerholt 2011**, this article aims to place trigger point dry needling within the context of pain sciences. From a pain science perspective, trigger points are constant sources of peripheral nociceptive input leading to peripheral and central sensitization. Dry needling cannot only reverse some aspects of central sensitization, it reduces local and referred pain, improves range of motion and muscle activation pattern, and alters the chemical environment of trigger points. It also says Trigger point dry needling should be based on a thorough understanding of the scientific background of trigger points, the differences and similarities between active and latent trigger points, motor adaptation, and central sensitize application.

- **E.K. Agyekum** 2015, this article reviews the various causes of heel pain and various conservative treatment procedures followed till now. Causes of plantar heel pain are Plantar fasciitis , Atrophy of heel pad ,Posttraumatic, (e.g., calcaneal fracture),Enlarged calcaneal spur .Causes of posterior heel pain Retro calcaneal bursitis ,Achilles tendinitis, Haglund's deformity, Degeneration of Achilles tendon insertion. Neurological conditions such as tarsal tunnel syndrome or entrapment of

nerve to abductor digiti quinti. Degenerative disk disease with radiation toward heel Systemic disease, (e.g., Reiter's syndrome, psoriatic arthritis), Acute tear of plantar fascia, Calcaneal apophysitis. Almost all the conservative treatments work well and surgery will be the last option. Proper supporting shoes will be the most appropriate adjuvant to all the treatments.

- **LUCAS KR 2004** -This experimental study explains how latent trigger points affects the normal functioning and capability of a muscle. When there is dysfunction in a proximal body segment, distal segments have to change workloads in order to preserve movement outcomes at the most distal body segment. The presence of pain could affect the muscle activation pattern (MAP). The effects of pain-free latent Myofascial trigger points (LTrPs) in the scapular rotator muscle group were investigated. The data established that LTrPs in the scapular rotator muscles changes the muscle activation pattern (MAP) of this muscle group and of muscles further distal in the shoulder girdle kinetic chain. Treatment to remove LTrPs normalised the MAP.

- **RÔMULO RENAN-ORDINE, 2011** - this experimental study demonstrated that the addition of TrP manual therapies to a self-stretching protocol is superior than the sole application of self-stretching in the treatment of individuals with plantar heel pain at short term. The taut bands and tightness of the muscles gastrocnemius and soleus was released with appropriate pressure and neuromuscular technique (longitudinal stroke) and self- stretching were taught and the results and outcomes were extremely good. Significant increases in PPT levels

within the TrP group were also found supporting ant nociceptive effects of TrP therapy.

- **Mathew P.Cochett, 2011** - this study was conducted to evaluate whether trigger point dry needling is more effective in reducing plantar heel pain than a sham dry needling intervention. Trigger points of muscles like soleus, flexor digitorum brevis, quadratus plantae and abductor hallucis were assessed mainly and the synergists and antagonists of these muscles were also assessed accordingly. It also evaluated, whether dry needling results in changes to foot function, general foot health, depression, anxiety and stress and health-related quality of life in people with plantar heel pain. There are no guidelines regarding the use of dry needling for plantar heel pain so far. Therefore, this consensus study using a modified Delphi process, established a dry needling protocol for plantar heel pain.

- **PRICE. DD** - The study explained that VAS provides a simple technique for measuring subjective experience. They have been established as valid and reliable in a range of clinical research applications. Although there is also evidence of increase error and decrease sensitivity when using with some subject groups. Decisions concerned with the choice of scoring interval, experimental design, and statistical analysis for VAS have in some instances been bases on convention, assumption and convenience, highlighting the need for more comprehensive assessment of individual scales if this versatile and sensitive measurement technique is to be used to full advantage.

- **Budiman-Mak** 1991- conducted a study to check the reliability and validity of foot function index (FFI) and is one of the methods to measure the impact of foot pathology on function in terms of pain, disability and activity restriction and a strong correlation was found between the FFI total and sub-scale scores (α=0.96 – 0.73). Clinical measures of foot pathology supported the criterion validity of the index. Hence, FFI should prove useful for both clinical and research purposes.

- **SooHoo NF** - This study evaluates the validity of the Foot Function Index (FFI) by examining its level of correlation to the Medical Outcomes Study Short Form-36 (SF-36). The SF-36 is an extensively validated outcomes tool that has been used as a benchmark in examining the validity of several orthopaedic outcomes tools. The consistently moderate to high levels of correlation of the FFI to the SF-36 seen in this study support the FFI as a valid measure of health status. This suggests that the FFI is a reasonable method to monitor patient outcomes.

DESIGN AND METHODOLOGY

STUDY DESIGN: Quasi experimental study.

STUDY SETTING: Hospitals and Clinics approved by College and Guide.

STUDY DURATION: 4 weeks

SAMPLE SIZE: 30 subjects (15 in each)

SAMPLING METHOD: Simple random sampling method.

INCLUSION CRITERIA:

- Age group between 25 – 55 years.
- Patients of both sexes.
- Unilateral symptomatic plantar heel pain.
- Subjects should be actively participating in the study.
- Subjects with pain in the plantar aspect of the heel.
- Pain in the heel on the first step in the morning.
- Subjects using improper footwear like high heels, hard shoes, slippers etc.
- Lack of proper exercise and stretching.
- Overweight and obese patients.
- Subjects with heel spur.
- Subjects with prolonged standing hours.
- Sedentary workers using high sitting chairs.

EXCLUSION CRITERIA:

- Age above 55 yrs.
- Subjects with other neuromuscular deficits
- Subjects with infective diseases of lower limb.
- Subjects with impaired lower limb circulation.
- Corticosteroid injection in heel, preceding 3 months.
- Subjects with history of foot fractures.
- Subjects with neuromuscular injuries of foot.
- Subjects with tumour.
- Subjects with foot deformity.
- Subjects with mental disability.
- Subjects not willing to participate in study.

METHOD OF COLLECTION OF DATA:

30 subjects were chosen based on inclusion and exclusion criteria. Both female and male subjects between 25 to 55 years will be taken. Consent form was filled by the subjects stating the voluntary participation in this study. The subjects was be informed about the procedure.

- Group A - consist of 15 subjects with plantar heel pain who were given myofascial trigger release and stretching technique.
- Group B - consist of 15 subjects with plantar heel pain were given dry needling.

Group A and Group B subjects will be compared to know which treatment is more effective.

PARAMETERS:

- Visual analogue scale (VAS Scale)
- Foot function index (FFI)

MATERIALS USED:

- Couch and chair
- Towel roll
- Pillows
- Dry needles of approximate size.
- Gloves
- Sharp containers
- Sterile hand rub
- Blanket
- Visual analogue scale chart
- Foot function index chart

PROCEDURE:

Subjects were divided into two groups Group A and Group B. Each group will consist of 15 subjects.

- Group A – myofascial manual trigger release technique and stretching
- Group B – Dry needling

Treatment was given for 3 sessions per week and the total treatment period was for 4 weeks.

GROUP A:

Manual trigger release technique with stretching:

Manual trigger release technique will be given in group A along with stretching.

The subject were laid on a couch and the affected side leg was kept extended on the couch in a comfortable positioning according to the muscle. The therapist will stand or sit on the affected side of the subject's leg and treated with her thumb or elbow on the necessary muscles like the soleus, Gastrocnemius, abductor hallucis, quadratus plantae with the required pressure.

Stretching of the above muscles and plantar fascia was taught and made to do 3 stretches using a 20 second hold , 20 second recovery time and will be repeated 3 times, twice a day.

GROUP B:

Dry Needling:

The patient was asked to prone lying or supine on the couch accordingly to the muscle to be palpated and the therapist in sitting position to reach the muscle in a comfortable position. The muscle was carefully palpated using pincer and flat palpation accordingly and the taught band or trigger point were identified and needled till the muscle twitches was observed or to the tolerance level of the patient. The needling technique should be done according to OSHA (Occupational Safety and Health Administration). Soleus, Gastrocnemius, abductor hallucis and quadratus plantae were treated.

DATA ANALYSIS AND INTERPRETATION

STATISTICAL TOOL:

1. PAIRED 't' TEST :

To calculate the parameter we will use the following formula:

$$t = \frac{\bar{d}}{\sqrt{s^2 / n}}$$

Where

- ‘d bar’ is the mean difference between two samples
- S^2 is the sample variance,
- n is the sample size and
- t is a paired sample t-test with n-1 degrees of freedom.

An alternate formula for paired sample t-test is:

$$t = \frac{\Sigma d}{\sqrt{\frac{n\left(\Sigma d^2\right) - \left(\Sigma d\right)^2}{n-1}}}$$

2. UNPAIRED 't' TEST :

This test is used only when it can be assumed that the two distributions have the same variance. (When this assumption is violated, see below.) The *t* statistic to test whether the means are different can be calculated as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s_{X_1X_2} \cdot \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where

$$s_{X_1X_2} = \sqrt{\frac{(n_1 - 1)s_{X_1}^2 + (n_2 - 1)s_{X_2}^2}{n_1 + n_2 - 2}}.$$

Note that the formulae above are generalizations of the case where both samples have equal sizes (substitute n for n_1 and n_2).

$s_{X_1X_2}$ is an estimator of the common standard deviation of the two samples: it is defined in this way so that its square is an unbiased estimator of the common variance whether or not the population means are the same.

In these formulae,

- n = number of participants,
- 1 = group one, 2 = group two.
- $n - 1$ is the number of degrees of freedom for either group, and
- The total sample size minus two (that is, $n_1 + n_2 - 2$) is the total number of degrees of freedom, which is used in significance testing.

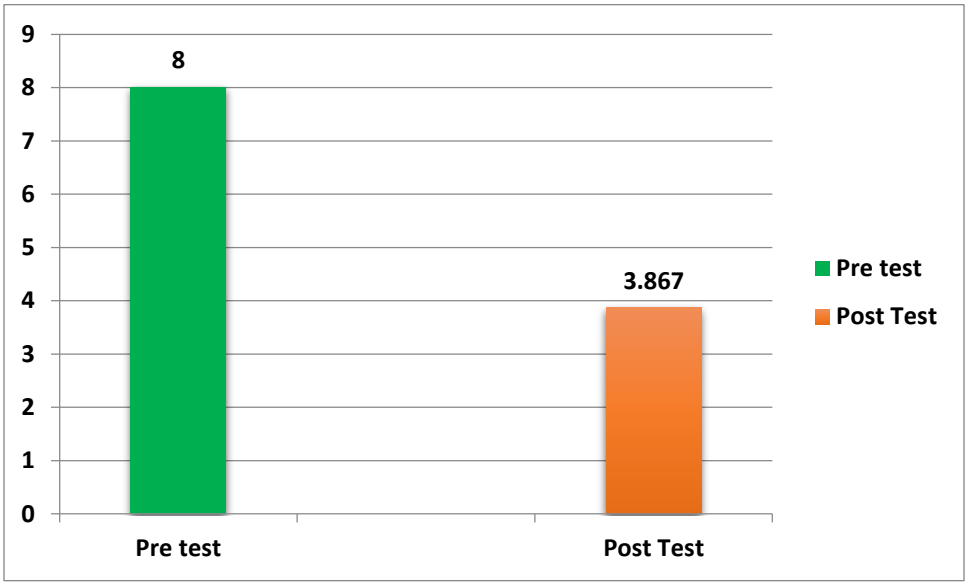
DATA PRESENTATION

The comparative mean value, mean difference, standard deviation and paired t-values between pre-test and post-test of VAS for pain in Group A.

TABLE 1:

S.NO	TEST	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t –VALUE & P value
1.	Pre-test	8	4.133	1.187	13.484
2.	Post -test	3.867			P=0.000

GRAPH 1:

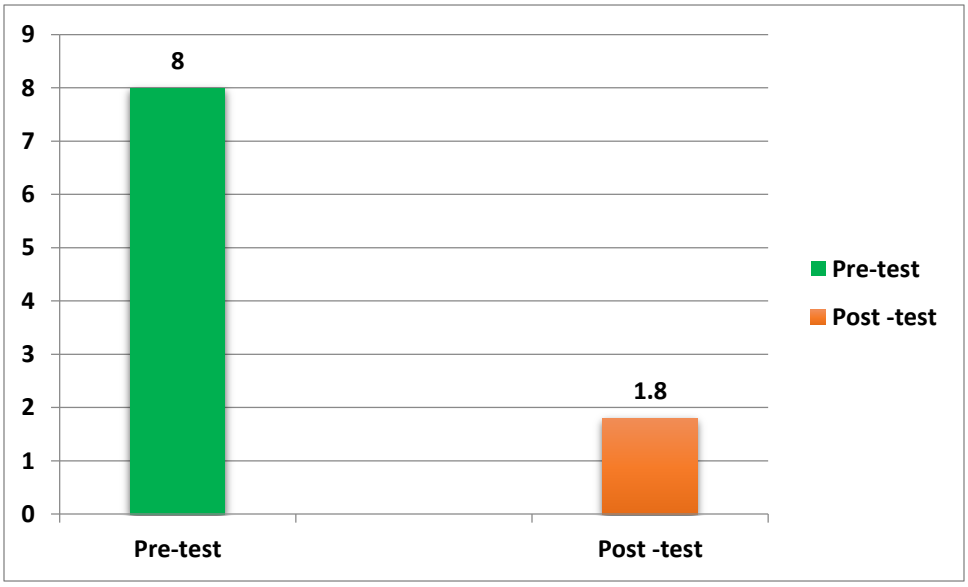


The comparative mean value, mean difference, standard deviation and paired t-values between pre-test and post-test of VAS for pain in Group B.

TABLE 2:

S.NO	TEST	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t –VALUE & p value
1.	Pre-test	8	6.2	0.8619	27.860
2.	Post -test	1.8			P=0.000

GRAPH 2:

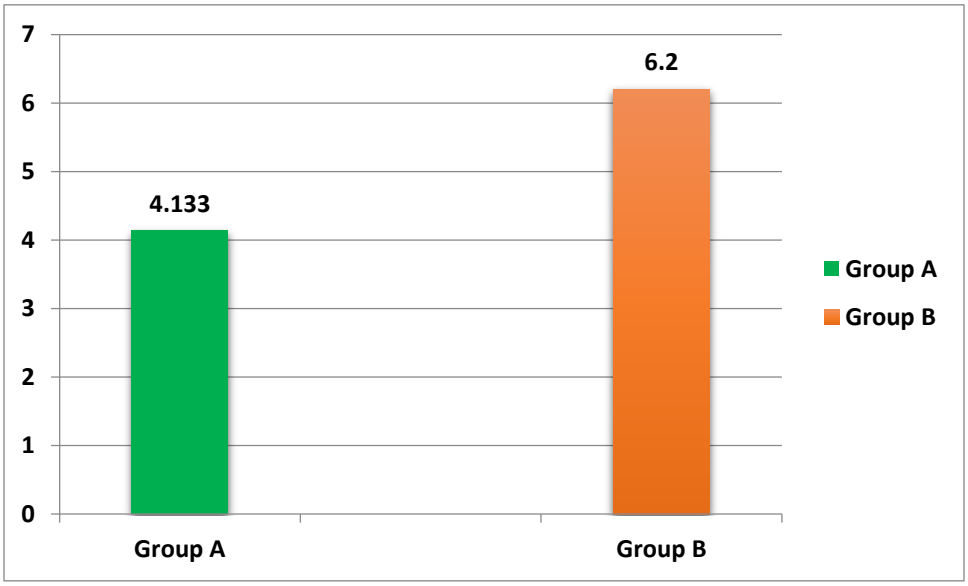


The comparative mean value, mean difference, standard deviation and unpaired 't' values of Visual Analogue Scale between Group A and Group B.

TABLE 3:

S.NO	TEST	MEAN	MEAN DIFFERENCE	PAIRED t-VALUE & p value
1.	Group A	4.133	2.067	5.457
2.	Group B	6.2		P=0.000

GRAPH 3:

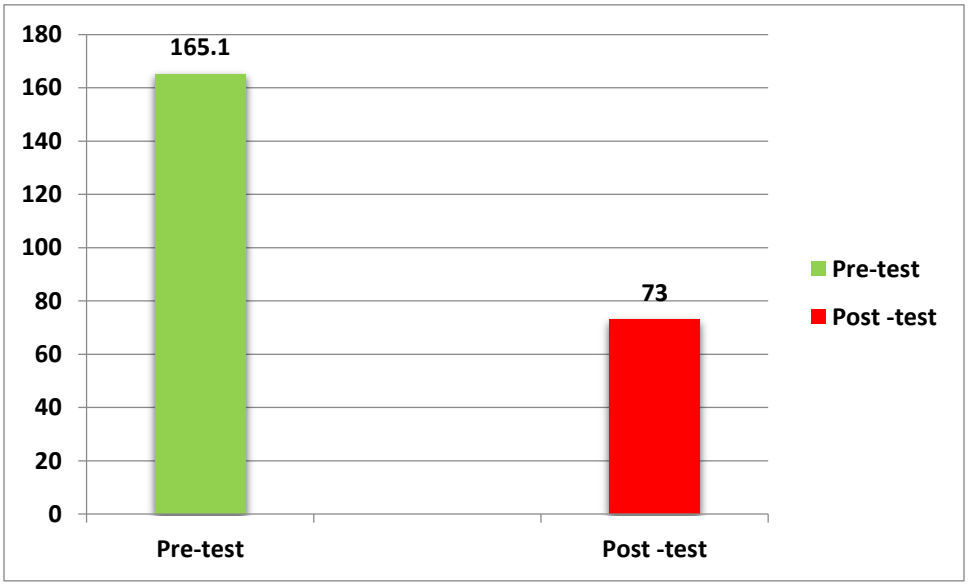


The comparative mean value, mean difference, standard deviation and paired t-values between pre-test and post-test of FFI for pain in Group A.

TABLE 4

S.NO	TEST	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t-VALUE & p value
1.	Pre-test	165.1	92.07	4.818	74.014 P=0.000
2.	Post - test	73			

GRAPH 4

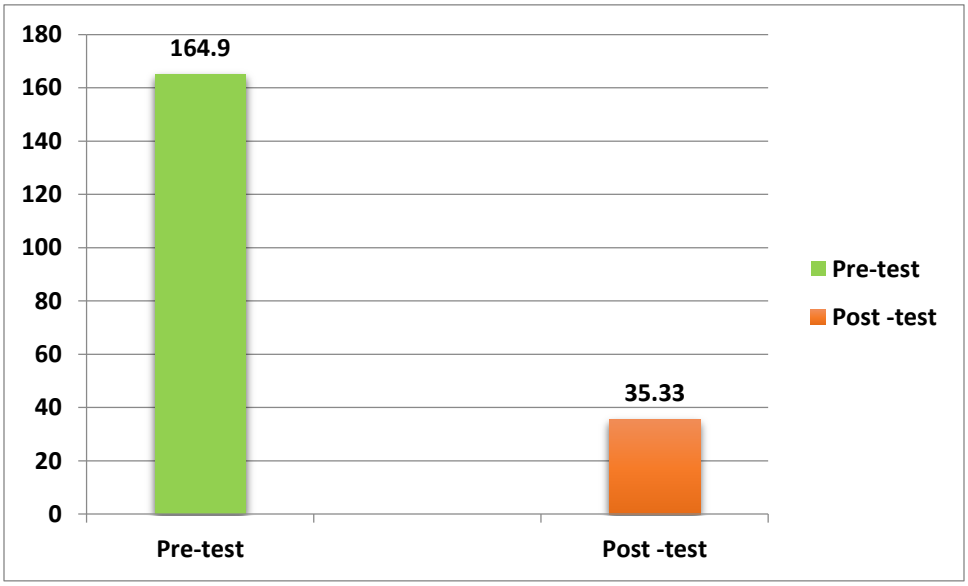


The comparative mean value, mean difference, standard deviation and paired t-values between pre-test and post-test of FFI for pain in Group B.

TABLE 5:

S.NO	TEST	MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	PAIRED t-VALUE & p value
1.	Pre-test	164.9	129.6	3.869	129.731 P=0.000
2.	Post - test	35.33			

GRAPH 5

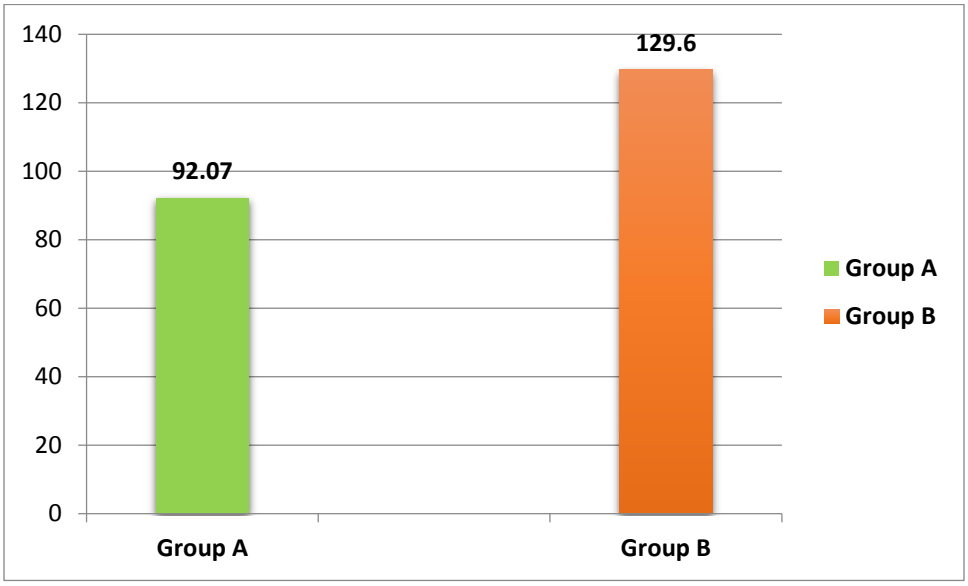


The comparative mean value, mean difference, standard deviation and paired t-values between pre-test and post-test of FFI for pain between Group A and Group B.

TABLE 6:

S.NO	TEST	MEAN	MEAN DIFFERENCE	PAIRED t-VALUE & p value
1.	Group A	92.07	37.53	23.523
2.	Group B	129.6		P=0.000

GRAPH 6:



RESULT

- **IN THE ANALYSIS AND INTERPRETATION OF VAS IN GROUP A**

  The paired t-value 13.484 was greater than the tabulated paired t-value of 4.14 which showed that there was statistically significant difference at 0.000 levels between pre and post result. The pretest mean was 8 and the posttest mean was 3.867 and the mean difference was 4.133 which showed that there was statistically significant pain relief of the plantar heel pain due to the effects of the manual myofascial trigger release and stretching.

- **IN THE ANALYSIS AND INTERPRETATION OF FFI IN GROUP A**

  The paired t-value 74.014 was greater than the tabulated paired t-value of 3.67 which showed that there was statistically significant difference at 0.000 levels between pre and post result. The pretest mean was 165.1 and the posttest mean was 73 and the mean difference was 92.07 which showed that there was statistically significant reduction of foot function disability due to the effects of the manual myofascial trigger release and stretching.

- **IN THE ANALYSIS AND INTERPRETATION OF VAS IN GROUP B**

  The paired t-value 27.860 was greater than the tabulated paired t-value of 4.14 which showed that there was statistically significant difference at 0.000 levels between pre and post result. The pretest mean was 8 and the posttest mean was 1.8 and the mean difference was 6.2 which showed that there was statistically significant pain relief of the plantar heel pain due to the effects of the dry needling.

- **IN THE ANALYSIS AND INTERPRETATION OF FFI IN GROUP B**

  The paired t-value 129.731 was greater than the tabulated paired t-value of 3.67 which showed that there was statistically significant difference at 0.000 levels between pre and post result. The pretest mean was 164.9 and the posttest mean was 35.33 and the mean difference was 129.6 which showed that there was statistically significant reduction in foot function disability due to the effects of the dry needling.

- **IN THE ANALYSIS AND INTERPRETATION OF VAS IN GROUP A AND GROUP B.**

  The unpaired t-value 5.457 was greater than the tabulated unpaired t-value of 4.14 which showed that there was statistically significant difference at 0.000 level between the mean difference of Group A and Group B. The pre Vs. post mean of Group A was 4.133 and the pre Vs. post mean of Group B was 6.2 , and the mean difference of Group A and Group B was 2.067 which showed that there was statistically

pain significant pain reduction in plantar heel pain in response to treatment in Group B when compared to Group A.

Therefore, the study was rejecting the null hypothesis and accepting the alternate hypothesis.

- **IN THE ANALYSIS AND INTERPRETATION OF FFI GROUP A AND GROUP B**

  The unpaired t-value 23.523 was greater than the tabulated unpaired t-value of 3.67 which showed that there was statistically significant difference at 0.000 level between the mean difference of Group A and Group B. The pre Vs. post mean of Group A was 92.07 and the pre Vs. post mean of Group B was 129.6 , and the mean difference of Group A and Group B was 37.53 which showed that there was statistically significant reduction in foot function disability in response to treatment in Group B when compared to Group A.

Therefore, the study was rejecting the null hypothesis and accepting the alternate hypothesis.

DISCUSSION

The aim of the study was to compare the treatment effects of the manual myofascial trigger point release and dry needling therapy in reduction of pain in plantar heel pain and improve functional ability of the foot. The magnitude of the VAS and FFI were measured and computed for the comparative study.

Renan- Ordine R 2011, et al conducted an experimental study on sixty patients, 15 men and 45 women with a clinical diagnosis of plantar heel pain were randomly divided into 2 groups: a self-stretching (Str) group who received a stretching protocol, and a self-stretching and soft tissue TrP manual therapy (Str-ST) group who received TrP manual interventions (TrP pressure release and neuromuscular approach) in addition to the same self-stretching protocol. The 2 × 2 mixed-model analysis of variance (ANOVA) revealed a significant group-by-time interaction for the main outcomes of the study: physical function (P = .001) and bodily pain (P= .005); patients receiving a combination of self-stretching and TrP tissue intervention experienced a greater improvement in physical function and a greater reduction in pain, as compared to those receiving the self-stretching protocol. The mixed ANOVA also revealed significant group-by-time interactions for changes in PPT over the gastrocnemii and soleus muscles, and the calcaneus (all P<.001). Patients receiving a combination of self-stretching and TrP tissue intervention showed a greater improvement in PPT, as compared to those who received only the self-stretching protocol

Matthew P. Cotchett 2014, et al conducted a randomised controlled study on 84 patients with plantar heel pain of at least 1 month's duration. Intervention Participants were randomly assigned to receive real or sham trigger point dry needling. The intervention consisted of 1 treatment per week for 6 weeks. Participants were followed for 12 weeks. Measurements Primary outcome measures included first-step pain, as measured with a visual analog scale (VAS), and foot pain, as measured with the pain subscale of the Foot Health Status Questionnaire (FHSQ). The primary end point for predicting the effectiveness of dry needling for plantar heel pain was 6 weeks. Results At the primary end point, significant effects favoured real dry needling over sham dry needling for pain (adjusted mean difference: VAS first-step pain=−14.4 mm, 95% confidence interval [95% CI]=−23.5 to −5.2; FHSQ foot pain=10.0 points, 95% CI=1.0 to 19.1), although the between-group difference was lower than the minimal important difference. The number needed to treat at 6 weeks was 4 (95% CI=2 to 12). The frequency of minor transitory adverse events was significantly greater in the real dry needling group (70 real dry needling appointments [32%] compared with only 1 sham dry needling appointment [<1%]).n.

Rocio Llamas-Ramos 2014, et al conducted a randomised clinical study on ninety-four patients were randomized into a TrP DN group or a TrP MT group Neck pain intensity (11-point numeric pain rating scale), cervical range of motion, and pressure pain thresholds (PPTs) over the spinous process of C7 were measured at baseline, post intervention, and at follow-ups of 1 week and 2 weeks after treatment. The ANOVA revealed that participants who received TrP DN had outcomes similar to those who received TrP MT in terms of pain, function, and cervical range of motion.

The 4-by-2 mixed-model ANOVA also revealed a significant time-by-group interaction (P<.001) for PPT: patients who received TrP DN experienced a greater increase in PPT (decreased pressure sensitivity) than those who received TrP MT at all follow-up periods (between-group differences: post treatment, 59.0 kPa; 95% confidence interval [CI]: 40.0, 69.2; 1-week follow-up, 69.2 kPa; 95% CI: 49.5, 79.1; 2-week follow-up, 78.9 kPa; 95% CI: 49.5, 89.0). The results of this clinical trial suggest that 2 sessions of TrP DN and TrP MT resulted in similar outcomes in terms of pain, disability, and cervical range of motion. Those in the TrP DN group experienced greater improvements in PPT over the cervical spine.

Joos E,Peretz A 1991, et al – conducted experimental study on rheumatology patients. Test–retest reliability has been shown to be good, but higher among literate (r= 0.94, P= 0.001) than illiterate patients (r = 0.71, P= 0.001) before and after attending a rheumatology outpatient clinic. In the absence of a gold standard for pain, criterion validity cannot be evaluated. For construct validity, in patients with a variety of rheumatic diseases, the pain VAS has been shown to be highly correlated with a 5-point verbal descriptive scale (“nil,” “mild,” “moderate,” “severe,” and “very severe”) and a numeric rating scale (with response options from “no pain” to “unbearable pain”), with correlations ranging from 0.71–0.78 and 0.62–0.91, respectively). The correlation between vertical and horizontal orientations of the VAS is 0.99. It is often used in epidemiologic and clinical research to measure the intensity or frequency of various symptoms.

Budiman-Mak 1991, et al – conducted an experimental study on 87 rheumatoid arthritis patients to examine the construct validity of the FFI. With the exception of two items, factor analysis supported the construct validity of the total index and the subscales. Strong correlation between the FFI total and subscale scores and clinical measures of foot pathology supported the criterion validity of the index. The FFI was examined for test-retest reliability and internal consistency. Test-retest reliability of the FFI total and subscale scores ranged from 0.87 to 0.69. Internal consistency ranged from 0.96 to 0.73. It is proved that the FFI is a reliable instrument for patients with rheumatoid arthritis and it is also recommended as a reliable measurement scale for use in other foot orthopaedic interventions trials. The FFI has been validated and determined to be a reliable instrument for patients with rheumatoid arthritis and non-traumatic foot or ankle problems.

Reasons for Improvement in Manual Myofascial Trigger Point Release and Stretching:

- It deactivates the hyper irritable spots or the taut bands.
- It reduces pain threshold and sensitivity.
- It reduced hypoxia thereby increasing oxygen supply.
- The amount of pressure reduced the muscle tension and stiffness.
- It improves blood circulation which strives toward equilibrium, by sending a "flush" of blood and lymph, which contain constituents that temporarily alleviate pain (endorphins), which also "flush" out inflammatory chemicals (substance P, prostaglandins, bradykinin.
- Improves Normal sleep.
- Improvement in fitness level and quality of life

Reasons for the Improvement in Dry Needling Therapy

- Dry needling is very precise and accurate.
- Dry needling produces stimulation of a local twitch response (LTR). An LTR is an involuntary spinal cord reflex contraction of the muscle fibres in a taut band. Triggering an LTR has been shown to reduce the concentration of nociceptive substances in the chemical environment near myofascial trigger points.
- Dry-needling can restore muscle activation and strength as well as ROM by deactivating latent myofascial trigger points.
- Dry needling s produces stimulation of the sensory afferent A δ activates enkephalinergic, serotonergic, and noradrenergic inhibitory systems. Together they work as opioid mediated analgesia system (OMAS) in reducing pain.
- Dry needling reduces peripheral and central sensitization.
- Dry needling alters biochemicals associated with pain and inflammations are elevated in sites near to and remote from active myofascial trigger points.
- Needling itself causes muscle relaxation and stiffness.

Reasons for improvement in dry needling than manual trigger point therapy and stretching.

- Dry needling is very precise and accurate in inactivating myofascial trigger point.
- Dry needling gives less effort to the therapist.
- Dry needling is very faster and effective and time saving.
- Dry needling has increased its compliance in rehabilitation program.

- Dry needling can be done on deep muscles where manual trigger point release fails and restores normal sleep.
- Dry needling improved blood circulation, oxygen supply and balance of pH were restored.
- Dry needling produces stimulation of a local twitch response (LTR). An LTR is an involuntary spinal cord reflex contraction of the muscle fibres in a taut band. Triggering an LTR has been shown to reduce the concentration of nociceptive substances in the chemical environment near myofascial trigger points.
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- Dry needling s produces stimulation of the sensory afferent A δ activates enkephalinergic, serotonergic, and noradrenergic inhibitory systems. Together they work as opioid mediated analgesia system (OMAS) in reducing pain.
- Dry needling reduces peripheral and central sensitization.
- Dry needling alters biochemicals associated with pain and inflammation are elevated in sites near to and remote from active myofascial trigger points.
- Dry needling reduces the abnormal muscle endplate activity at the neuro muscular junction which leads to formation taut bands by excessive release of acetyl cholinesterase.
- Needling effect of dry needling itself causes muscle relaxation and stiffness.
- Dry needling outcomes like pain relief, muscle stiffness and swelling was for long term and Improves fitness level and quality of life.

SUMMARY AND CONCLUSION

The objective of the study was to compare the effect of manual myofascial trigger release and stretching and dry needling for reducing pain and functional independence in plantar heel pain.

To conduct the study, a total number of 30 patients, were selected by simple random sampling method after the consideration of inclusion and exclusion criteria. The informed consent were obtained from subjects individually.

Visual analogue scale and Foot function scale were taken as parameters to measure changes.

The pre-treatment data were collected and computed for Group A and Group B.

Group A subjects were given were manual myofascial trigger release and stretching and Group B were given dry needling weekly thrice for four weeks. The results of the same parameters were recorded after 2 weeks of treatment. The post treatment data were collected and computed for Group A and Group B.

The paired 't' test was used to compare the pre versus post treatment results of Group A and Group B separately. The unpaired 't' test was used to compare the mean difference of Group A and Group B.

In the analysis and interpretation of Visual analogue scale between Group A and Group B, unpaired 't' value 5.457 was greater than the tabulated 't' value of 4.14 at 0.000 level, which shows that there was statistically significant difference between pre and post treatment values of Group A and Group B, the mean value of Group B was 6.2 which was greater than the group A value of 4.133 which shows that there was significant decrease in pain in Group B compared to Group A in response to intervention.

In the analysis and interpretation of Foot function index between Group A and Group B, unpaired 't' value 23.523 was greater than the tabulated 't' value of 3.67 at 0.000 level, which shows that there was statistically significant difference between pre and post treatment values of Group A and Group B, the mean value of Group B was 129.6 which was greater than the group A value of 92.07, which shows that there was significant increase in functional activities in Group B compared to Group A in response to intervention.

CONCLUSION:

Myofascial pain and TrPs must be considered an etiology for Plantar Heel Pain, as Trigger points and referred pain can give plantar heel pain. Treatment of TrPs is a good alternative when other conservative treatments have failed. Dry needling is a relatively safe and simple treatment modality. Excellent patient satisfaction is often seen when dry needling is combined with conventional modalities.

This study shows that there were was reduced pain and increased functional activity statistically in plantar heel pain patients after the treatment with dry needling than with manual myofascial trigger release and stretching.

Thus the study concluded that dry needling was an effective treatment for Plantar heel pain patients and Visual analogue scale and Foot function index could be used as the assessment tools for Plantar heel pain patients.

RECOMMENDATION

The current study can be conducted in a larger study sample and include more subjects with plantar heel pain associated with deformities of foot and other pain disorders can be studied . Long term follow ups and outcomes can be studied.

This study can be done using other parameters. Range of motion, gait analysis, biomechanical evaluation and pressure pain sensitivity can also be studied in future. This study can be conducted in challenging professionals like sports person, army men and astronauts. Other associated muscles like Gluts group, Semi group, Peroneus group, Tibialis anterior can be studied and included according to the condition of the patients. Dry needling should be learnt by all the physiotherapists to make it feasible, evidence based and result oriented to achieve patient satisfaction and thereby our professional satisfaction.

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APPENDIX- I

INFORMED CONSENT OF PARTICIPATE VOLUNTARY IN RESEARCH INVESTIGATION

Name :

Age :

Sex :

Occupation :

Address for communication :

Declaration

I have fully understood the nature and the purpose of the study. I accept myself as a subject in this study. I declare that the above information is true and best of my knowledge.

Date : **Signature of the Subject**

Place :

APPENDIX- II

ASSESSMENT CHART

Name :

Age :

Sex :

Occupation :

Address :

Chief complaint :

Mode of treatment : (1) Manual trigger point release and stretching

(2) Dry needling

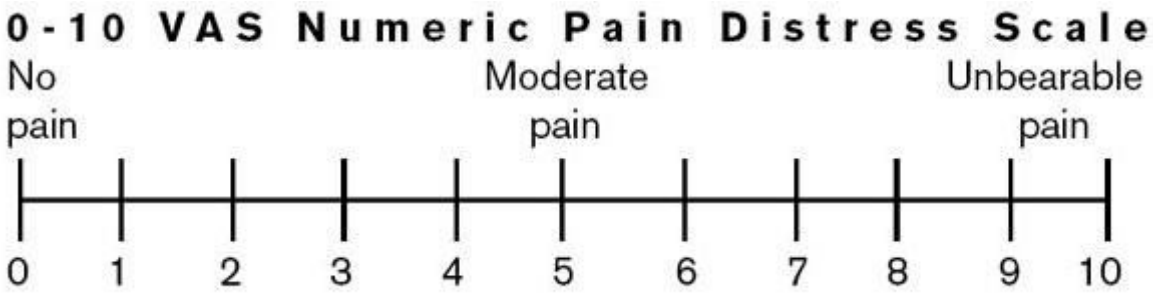
Parameter	**Before Treatment**	**After Treatment**
Visual Analog Scale (VAS in cm for pain response)		
Foot Function index (FFI)		

Signature of the Investigator

APPENDIX III

Visual Analogue Scale:

:



APPENDIX- IV

Foot Function Index

Patient Name: _____

Date:_____

This questionnaire has been designed to give your therapist information as to how your foot pain has affected your ability to manage in everyday life. Please answer every question. For each of the following questions, we would like you to score each question on a scale from 0 (no pain or difficulty) to 10 (worst pain imaginable or so difficult it required help) that best describes your foot over the past WEEK. Please read each question and place a number from 0-10 in the corresponding box.

No Pain 1 2 3 4 5 6 7 8 9 10 Worst Pain Imaginable

Pain Subscale: How severe is your foot pain:

_____

Foot pain at its worst?	
Foot pain in morning?	
Pain walking barefoot?	
Pain standing barefoot?	
Pain walking with shoes?	
Pain standing with shoes?	
Pain walking with orthotics?	
Pain standing with orthotics?	
Foot pain at end of day?	

Disability Subscale: How much difficulty did you have?

Difficulty walking in house?	
Difficulty walking outside?	
Difficulty walking 4 blocks?	
Difficulty climbing stairs?	
Difficulty descending stairs?	
Difficulty standing tip toe?	
Difficulty getting up from chair?	
Difficulty climbing curbs?	
Difficulty walking fast?	

Activity Limitation Subscale: How much of the time do you:

Stay inside all day because of feet?	
Stay in bed because of feet?	
Limit activities because of feet?	
Use assistive device indoors?	
Use assistive device outdoors?	

Office Use Only: Score: ____/230 points (MDC: 7 points; No Disability "0") Number of PT Sessions: _____ Gender: M F Age: _____ ICD-9 Code: _____ PT Initials: _____

APPENDIX- V

Treatment Photos

Abductor Hallucis

Manual Trigger Point Release	Dry Needling
	
	

Quadratus plantae

Manual Trigger Point Release	Dry Needling
	
	

Gastrocnemius

Manual Trigger Point Release	Dry Needling
	
	

MASTER CHART

Sl No.	GROUP A MANUAL MYOFASCIAL TRIGGER RELEASE& STRETCHING				GROUP B DRY NEEDLING			
	VAS		FFI		VAS		FFI	
	PRE	POST	PRE	POST	PRE	POST	PRE	POST
1	9	5	160	74	9	2	160	38
2	8	5	165	72	9	3	165	36
3	9	4	170	80	7	1	168	40
4	8	6	167	76	7	2	162	31
5	7	3	163	72	9	2	164	34
6	8	3	168	73	8	2	169	37
7	7	4	170	75	8	1	166	32
8	9	4	159	74	6	1	161	34
9	9	6	161	70	7	1	167	40
10	8	2	164	71	8	3	163	31
11	6	2	169	77	9	3	160	33
12	8	2	162	60	8	1	162	37
13	7	4	167	79	8	2	170	32
14	8	4	165	64	8	2	166	35
15	9	4	166	78	9	1	171	40